#10 다음 복소수를 계산한 다음, 극좌표 형식으로 나타내어라.

(1) $(\cos\frac{\pi}{9}+i\sin\frac{\pi}{9})^{12}\{2(\cos\frac{\pi}{6}+i\sin\frac{\pi}{6})\}^5$

풀이) $\cos\frac{\pi}{9}+i\sin\frac{\pi}{9}=e^{i\frac{\pi}{9}} \Rightarrow (\cos\frac{\pi}{9}+i\sin\frac{\pi}{9})^{12}=(e^{i\frac{\pi}{9}})^{12}=e^{i\frac{4}{3}\pi}$

$2(\cos\frac{\pi}{6}+i\sin\frac{\pi}{6})=2e^{i\frac{\pi}{6}} \Rightarrow \{2(\cos\frac{\pi}{6}+i\sin\frac{\pi}{6})\}^5=(2e^{i\frac{\pi}{6}})^5=32e^{i\frac{5}{6}\pi}$

$x=32\cos\frac{\pi}{6}=16\sqrt{3}$, $y=32\sin\frac{\pi}{6}=16$

풀이과정 Good!!

$\therefore (\cos\frac{\pi}{9}+i\sin\frac{\pi}{9})^{12}\{2(\cos\frac{\pi}{6}+i\sin\frac{\pi}{6})\}^5$

$=e^{i\frac{4}{3}\pi}\times 32e^{i\frac{5}{6}\pi}=32e^{i(\frac{4}{3}\pi+\frac{5}{6}\pi)}=32e^{i\frac{13}{6}\pi}$

$=32e^{i(2\pi+\frac{\pi}{6})}=32e^{i\frac{\pi}{6}}$

~~답: $32e^{i\frac{\pi}{6}}$~~ → 지수형

답 $=32\angle\frac{\pi}{6}=(16\sqrt{3},16)$ → 극형식=극라표형식, 직교라표

(2) $\dfrac{\{8(\cos\frac{3}{8}\pi+i\sin\frac{3}{8}\pi)\}^3}{\{2(\cos\frac{\pi}{16}+i\sin\frac{\pi}{16})\}^{10}}$

풀이) $8(\cos\frac{3}{8}\pi+i\sin\frac{3}{8}\pi)=8e^{i\frac{3}{8}\pi}$

$\{8(\cos\frac{3}{8}\pi+i\sin\frac{3}{8}\pi)\}^3=8^3e^{i\frac{9}{8}\pi}$

$2(\cos\frac{\pi}{16}+i\sin\frac{\pi}{16})=2e^{i\frac{\pi}{16}}$

$\{2(\cos\frac{\pi}{16}+i\sin\frac{\pi}{16})\}^{10}=2^{10}e^{i\frac{5}{8}\pi}$

$\therefore \dfrac{\{8(\cos\frac{3}{8}\pi+i\sin\frac{3}{8}\pi)\}^3}{\{2(\cos\frac{\pi}{16}+i\sin\frac{\pi}{16})\}^{10}}=\dfrac{2^9e^{i\frac{9}{8}\pi}}{2^{10}e^{i\frac{5}{8}\pi}}=\frac{1}{2}e^{i\frac{4}{8}\pi}=\frac{1}{2}e^{i\frac{1}{2}\pi}$

답: $\frac{1}{2}e^{i\frac{1}{2}\pi}$ → 지수형

$=\frac{1}{2}\angle\frac{\pi}{2}$ → 극형식 = 극라표형식

$=(0,\frac{1}{2})$ → 직교라표

$x=\frac{1}{2}\cos\frac{\pi}{2}=0$, $y=\frac{1}{2}\sin\frac{\pi}{2}=\frac{1}{2}$

※ $z=x+iy$ ⇐ 복소수의 정의

$=(x,y)$ ⇐ 직교라표

$=r\angle\theta$ ⇐ 극형식=극라표형식

$=re^{i\theta}$ ⇐ 지수형